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ABSTRACT:

PROBLEM TO BE SOLVED: To provide parts for a film forming device with a spray-coated film thereon which are free from peeling or drop even when a film forming material is adhered to increase the film thickness therefore free from generation of particles, and capable of increasing the cleaning interval of the film forming device, and also provide a method for manufacture thereof.

SOLUTION: An Al spray-coated film of about 0.6 mm in thickness having unevenness of truncated pyramidal shape of about 400

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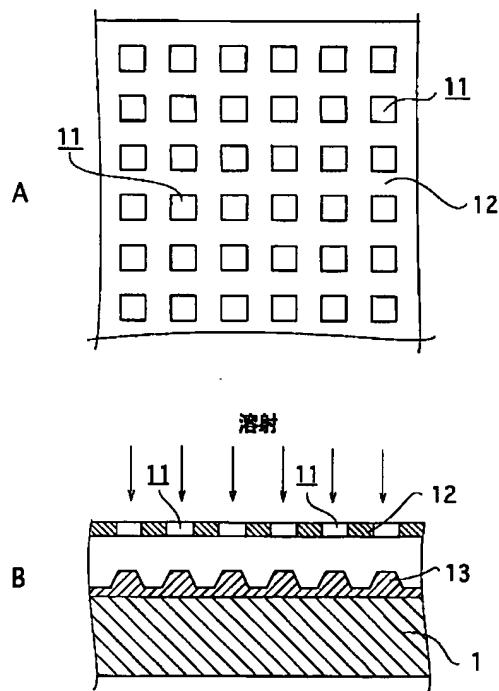
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(54)【発明の名称】 成膜装置用部品およびその製造方法

(57)【要約】

【課題】 溶射膜の形成された成膜装置用部品において、成膜材料が付着し厚膜化しても剥離、脱落せず、従ってパーティクルを生じ難く、従って成膜装置のクリーニング間隔の長期間化を可能ならしめる成膜装置用部品およびその製造方法を提供すること。

【解決手段】 成膜装置用部品であるシャッターのSUS304製の母材1に対して、格子の目が3mm角の正方形で6mmピッチの格子状マスク12を介し上方からA1溶射を施すことにより、底面から頂上までの高さHが約400μmの角錐台形状の凹凸を有する約0.6mm厚さのA1溶射膜を形成させた。得られたシャッターをTiNのスパッタ成膜装置に組み込んで使用したところ、付着し成長したTiN厚膜が厚さが1.3mmになった時点で剥離が発生した。この剥離膜厚は従来のフラットなA1溶射膜を形成させた場合と比較して2倍以上であり、クリーニング間隔を2倍以上に延ばし得る。



【特許請求の範囲】

【請求項1】成膜装置内で使用され、表面に溶射膜が形成されている成膜装置用部品において、

前記溶射膜にそれ自体の表面粗さ(R_a)より大きい凹凸が多数に形成されていることを特徴とする成膜装置用部品。

【請求項2】前記凹凸が前記溶射膜上の任意の行方向と列方向にそれぞれ一定のピッチで形成された柱状の凸部と、前記凸部に連続し前記凸部とは反対形状の凹部との繰り返しからなり、前記凸部および前記凹部の形状が円錐形状、円錐台形状、角錐形状、角錐台形状、角柱形状、円柱形状、または端部が半球状の円柱形状である請求項1に記載の成膜装置用部品。

【請求項3】前記凹凸が前記溶射膜上の任意の一方向に一定のピッチで形成された山部と、前記山部に連続し前記山部とは反対形状の谷部との繰り返しからなり、前記山部と前記谷部との形状が蛇腹形状、簾の子形状、またはラックギア形状である請求項1に記載の成膜装置用部品。

【請求項4】前記溶射膜の材料がアルミニウムまたはチタンである請求項1から請求項3までの何れかに記載の成膜装置用部品。

【請求項5】前記成膜装置用部品が成膜源に近接して配置される部品、または気体状の成膜材料に接触する部品である請求項1から請求項4までの何れかに記載の成膜装置用部品。

【請求項6】成膜装置内で使用され、表面に溶射膜が形成されている成膜装置用部品の製造方法において、前記成膜装置用部品の母材の表面に対し格子状マスクまたは連子格子状マスクを介して溶射を施すか、前記母材の表面に通常的に前記溶射膜を形成させた後に、前記格子状マスクまたは前記連子格子状マスクを介してプラスト処理を施すか、

または、前記母材の表面に通常的に前記溶射膜を形成させた後に、前記溶射膜にエッチングレジスト膜をパターン状に形成し、前記溶射膜の露出している部分を選択的にエッチング処理を施すことにより、

前記溶射膜自体の表面粗さ(R_a)より大きい多数の凹凸を有する溶射膜を形成させることを特徴とする成膜装置用部品の製造方法。

【請求項7】前記格子状マスクとして、格子の目が正方形、正三角形、正六角形、または円形を単位としパターン状に形成されたものを使用する請求項6に記載の成膜装置用部品の製造方法。

【請求項8】前記溶射または前記溶射後のプラスト処理の途中において、前記母材と、前記格子状マスクまたは前記連子格子状マスクとの空間的な相対位置を変化させる請求項6または請求項7に記載の成膜装置用部品の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は成膜装置内で使用される成膜装置用部品およびその製造方法に関するものであり、更に詳しくは、成膜原料の付着物が剥離し難い成膜装置用部品およびその製造方法に関するものである。

【0002】

【従来の技術】従来、LSI、液晶ディスプレイ、光磁気ディスク、ハードディスク等は基板上へ目的に応じた成膜材料による薄膜を形成させて製造されるが、この成膜時にパーティクルと称される粒子径が数 μm 程度の微粒子が基板に付着して配線を短絡させるなどにより製品収率を大幅に低下させ、更には製品の信頼性を損なうという看過できない問題がある。

【0003】これに対しては従来から種々の対策が講じられており、例えばスパタリングについて言えば、搬送系から持ち込まれるもの、ターゲット材から発生するもの等についてはほぼ解決され、現在では、成膜装置内に組み込まれる構成部品、例えばシャッター（成膜源と基板との間において成膜をオン・オフさせる部品）、遮蔽板（成膜材料が基板以外の成膜装置へ付着することを防ぐために配置される部品、防着板とも称される）、その他に付着し、時間の経過と共に厚く成長した付着物が成膜中に剥離、脱落して飛散することがパーティクルの発生を招く大きい要因とされている。しかし、付着物が剥離、脱落する前に成膜装置の運転を停止して頻繁にクリーニングし付着物を除去することは成膜装置の稼働時間を短くし、生産性を大幅に低下させる。

【0004】上記の問題に対して、特開平3-87356号、特開平3-87357号、特開平3-16636

30 1号、特開平3-166362号の各公報には、エンボス加工により多数の凹凸を形成させた金属箔や蛇腹状金属箔を成膜装置用部品の表面に取り付ける技術が開示されている。このなかで、エンボス加工によって多数の凹凸を形成させた電解銅箔は既に市販されており、成膜装置用部品の形状に応じて、その表面を覆うように重ね、スポット溶接やリベットによって固定して使用されている。そして、電解銅箔は部品と共に成膜装置内で使用されて成膜材料が付着、堆積しても、付着物の剥離応力は電解銅箔が変形することによって緩和されるので、付着物の剥離、脱落の防止に有効であるとされている。

【0005】電解銅箔以外の方法としては、成膜装置用部品の表面に対して、小径の鋼球やアルミナ粒子を噴射させて吹き付けるショットブラストや、小径のガラス球を噴射させて吹き付けるガラスピーズブラスト(GBB)を行い、表面の清浄化を図ると共に凹凸を形成させて表面積を大にすることにより、付着物の付着強度を増大させようとする試みがある。また、成膜装置用部品の表面をショットブラストし、その上へ軟らかい金属溶射膜、例えばアルミニウム溶射膜を形成させる方法があり多用されている。この方法はアルミニウム溶射膜の上に

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付着物が堆積しても、軟らかいアルミニウム溶射膜が変形して剥離応力を緩和させるという点で合理的であり効果もある。

【0006】そのほか、特開平8-277460号公報には母材の表面に機械加工して凹凸を設け、更に硫酸に浸漬した成膜装置用部品が開示されており、特開平11-124661号公報には母材の表面に先ず銅(Cu)膜を形成し、更にその上へステンレス鋼(SUS420J2)による多孔性金属膜を形成させた成膜装置用部品が開示されている。

【0007】

【発明が解決しようとする課題】従来のエンボス加工された電解銅箔を使用する方法は、電解銅箔が使い捨てであり繰り返しての使用ができず、その取り付け取り外し作業が面倒であるほか、付着物の厚さが限度を越えると剥離応力によって電解銅箔が引き裂かれ、成膜装置用部品が露出するという問題を有している。また、成膜装置用部品の表面をショットブラストする方法は付着物の剥離、脱落の防止効果が十分でなく、その故にショットブラストを何回も繰り返すことになり、成膜装置用部品にショットブラスト時の衝撃熱による歪みが蓄積されて破損に至る場合がある。更には、表面にアルミニウム溶射膜等を形成させた成膜装置用部品は、成膜材料が剥離応力の大きいものである場合には、付着物の厚さが0.5mm程度になると、アルミニウム溶射膜と母材との間に剥離を生じるという問題があり、現在のところ、解決の方法は見出だされていない。また、特開平8-277460号公報および特開平11-124661号公報による成膜装置用部品は何れも硫酸等の酸を使用するので、作業性に簡便さを欠く。本発明は上述の問題に鑑みてなされ、成膜材料が付着し厚膜化しても剥離、脱落を生じ難い成膜装置用部品およびその製造方法を提供することを課題とする。

【0008】

【課題を解決するための手段】上記の課題は請求項1または請求項6によって解決されるが、その解決手段を説明すれば、請求項1の成膜装置用部品は、成膜装置内で使用され、表面に溶射膜が形成されている成膜装置用部品において、溶射膜にそれ自体の表面粗さ(Ra)より大きい凹凸が多数に形成されている部品である。このような成膜装置用部品は、その溶射膜の凹凸が成膜材料の付着物の投錨箇所として作用して付着強度を高めるほか、溶射膜が剥離応力を緩和させるので、付着物の厚さが比較的大になんでも剥離、脱落することはない。

【0009】請求項1に従属する請求項2の成膜装置用部品は、凹凸が溶射膜上の任意の行方向と列方向にそれぞれ一定のピッチで形成された柱状の凸部と、凸部に連続し凸部とは反対形状の凹部との繰り返しかなり、凸部および凹部の形状が円錐形状、円錐台形状、角錐形状、角錐台形状、角柱形状、円柱形状、または端部が半

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球状の円柱形状であるものである。このような成膜装置用部品は、成膜材料の種類と成膜装置用部品の形状に応じて上記の形状の何れかが適宜選択されることにより、付着物の付着強度の増大、付着物の剥離応力の溶射膜による緩和が溶射膜上で均等化され、付着物の剥離、脱落を抑制する。

【0010】請求項1に従属する請求項3の成膜装置用部品は、凹凸が溶射膜上の任意の一方向に一定のピッチで形成された山部と、山部に連続し山部とは反対形状の

10 谷部との繰り返しかなり、山部と谷部の形状が蛇腹形状、簪の子形状、またはラックギア形状の部品である。このような成膜装置用部品は、成膜材料の種類と成膜装置用部品の形状に応じて上記の形状の何れかが適宜選択されることにより、付着物の付着強度の増大、付着物の剥離応力の溶射膜による緩和が溶射膜上で均等化され、付着物の剥離、脱落を抑制する。

【0011】請求項1に従属する請求項4の成膜装置用部品は、溶射膜の材料がアルミニウムまたはチタンである部品である。このような成膜装置用部品は、溶射膜の

20 アルミニウムまたはチタンが比較的小さい弾性率の故に変形され易く、付着物の剥離応力を緩和し、剥離、脱落を抑制する。請求項1に従属する請求項5の成膜装置用部品は、成膜装置内で使用される部品の中で、成膜源に近接して配置される部品、気体状の成膜材料に接触する部品である。このような成膜材料が付着し易い部品であっても、本発明の成膜装置用部品は付着物の剥離、脱落を抑制する。

【0012】また請求項6の成膜装置用部品の製造方法は、成膜装置内で使用され、表面に溶射膜が形成されて

30 いる成膜装置用部品の製造方法において、成膜装置用部品の母材の表面に対し格子状マスクまたは連子格子状マスクを介して溶射を施すか、母材の表面に通常的に溶射膜を形成させた後に、格子状マスクまたは連子格子状マスクを介してブラスト処理を施すか、または、母材の表面に通常的に溶射膜を形成させた後に、溶射膜の表面にエッチングレジスト膜を所定のパターン状に形成し、溶射膜の露出している部分を選択的にエッチング処理を施すことにより、溶射膜自体の表面粗さ(Ra)より大きい多数の凹凸を有する溶射膜を形成させる方法である。このような成膜装置用部品の製造方法は、凹凸を有する溶射膜が形成された成膜装置用部品を容易に製造することを可能ならしめる。

【0013】請求項6に従属する請求項7の成膜装置用部品の製造方法は、格子状マスクとして、格子の目が正方形、正三角形、正六角形、または円形を単位としてパターン状に形成されたものを使用する方法である。このような成膜装置用部品の製造方法は、成膜装置用部品の形状や成膜材料の種類に応じて、上記の格子の目の形状を選択し、好ましい形状の凹凸を有する溶射膜の形成された成膜装置用部品を製造することを可能にする。請求

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項6に從属する請求項8の成膜装置用部品の製造方法は、溶射、または溶射後のプラスト処理の途中において、母材と、格子状マスクまたは連子格子状マスクとの空間的な相対位置を変化させる方法である。このような成膜装置用部品の製造方法は、成膜装置用部品の形状や成膜材料の種類に応じて、好ましい形状の凹凸を有する溶射膜が形成された成膜装置用部品を製造することを可能にする。

【0014】

【発明の実施の形態】本発明の成膜装置用部品およびその製造方法は、上述したように、表面に溶射膜が形成された成膜装置用部品において、溶射膜にそれ自体の表面粗さ(R_a)より大きい凹凸が多数に形成されている成膜装置用部品と、格子状マスク等によって溶射膜に凹凸を形成させる成膜装置用部品の製造方法であるが、以下に本発明の実施の形態を図面によって説明する。

【0015】図1は成膜装置用部品を製造する方法の一例を示す図である。すなわち、図1のAは溶射時に使用される格子状マスク12の部分平面図であり、行方向と列方向に整列した正方形の格子の目11が形成されている。そして、図1のBは格子状マスク12を使用する成膜装置用部品の製造方法を示す断面図である。なお、格子状マスク12の格子材の断面は長方形としたが、長方形以外の形状としてもよい。図1のBを参照して、成膜装置用部品の母材1の表面から一定の高さ位置に格子状マスク12を保持し、上方から図示せずとも溶射ガン等によって格子の目11を通して例えば金属の溶射を行い、母材1の表面に格子の目11に対応する凹凸を持つ溶射膜13を形成させる。そして、図2は図1のBに示す方法によって製造された成膜装置用部品10の部分斜視図であり、母材1の表面に形成された角錐台形状の凹凸を有する溶射膜13を示す。なお、図1のB、図2は、溶射膜13の凹凸を概念的に示すものであり、凹凸のピッチ、凹凸の各部の厚さは比例関係には示されていない。

【0016】また、図3は一般な溶射膜3の表面粗さと、本発明の成膜装置用部品10における溶射膜13の凹凸との関係を概念的に説明する図である。すなわち、図3のAは通常に形成される溶射膜3の断面図であり、図3のBは本発明の成膜装置用部品10の断面図である。図3のAに示す溶射膜3は本来的には中心線平均粗さ R_a で示して10~20 μm の表面粗さを有している。これに対して図1のBの方法によって製造される成膜装置用部品10の溶射膜13は本来の表面粗さ R_a と共に、図3のBに示すように、凹部の底面Bから凸部の頂上Tまでの高さHが50 μm 程度の凹凸の場合から、高さHが2mm程度の凹凸の場合もあるが、何れにしてもその高さHは溶射膜3が有する本来の表面粗さ(R_a)よりも遥かに大きい。

【0017】図2の凹凸を持つ溶射膜13が形成されて

いる成膜装置用部品10は、図4の断面図に示す別な方法によっても製造することができる。図4のAを参照して、成膜装置用部品10の母材1の表面に通常的な溶射を施して厚さが大で均等な溶射膜13'を形成させる。次いで、図4のBを参照して、一点鎖線で示す均等な厚さの溶射膜13'の表面から一定の距離をあけた高さ位置に格子状マスク12を保持して、上方から図示せずともショットプラストガン等によって格子の目11を通して例えばアルミナの粉末またはガラスピーブ等を吹きつけてプラスト処理を施すことにより、溶射膜13'の表面が部分的に削られて凹凸を有する溶射膜13となり、目的とする成膜装置用部品10が製造される。図4のBにおいても、図1のBと同様、凹凸のピッチ、凹凸の各部の厚さは比例関係には示されていない。

【0018】そのほか、図4のB製造方法の変形として、溶射膜13'が例えばアルミニウム(A1)溶射膜である場合には、格子状マスク12に代えて、A1溶射膜の表面に直接にエッチングレジスト膜をパターン状に描画し、溶射膜13'の露出している部分を塩化鉄、リン酸、硝酸等の酸性液で選択的にエッチングし除去した後、エッチングレジスト膜を取り除くエッチング処理を施すことにより、凹凸を有する溶射膜13の形成された成膜装置用部品10を同様に製造することができる。

【0019】上記の図1のBに示した製造方法は縦方向と横方向との格子状マスク12を使用する方法であるが、成膜材料の付着物の剥離応力が若干小さい場合には、図5に示すように、縦(または横)方向だけの連子格子状マスク22を使用して、台形の波状の凹凸を有する溶射膜23の形成された成膜装置用部品20を製造することも可能である。図5を参照して、図5のAは溶射時に使用される連子格子状マスク22の部分平面図であり、行方向(または列方向)の格子の目21が形成されている。そして、図5のBは連子格子状マスク22を使用する成膜装置用部品の製造方法を示す断面図である。図5のBを参照して、成膜装置用部品20の母材1の表面から一定の高さ位置に連子格子状マスク22を保持し、上方から図示せずとも溶射ガン等によって格子の目21を通して例えば金属の溶射を行い、母材1の表面に格子の目21に対応する凹凸を持つ溶射膜23を形成させる。そして、図6は図5のBに示す方法によって製造された成膜装置用部品20の部分斜視図であり、母材1の表面に形成された台形の波状の凹凸を有する溶射膜23を示す。図5のBにおいても、図1のBと同様、凹凸のピッチ、凹凸の各部の厚さは比例関係に示されていない。

【0020】なお、図4においては成膜装置用部品10の母材1の表面に厚さが大で均等な溶射膜13'を形成させてから、格子状マスク12を介してショットプラスト処理を施す製造方法を説明したが、上記の方法で格子状マスク12に換えて連子格子状マスク22を使用する

ことによっても、図6に示した台形の波状の凹凸を有する溶射膜23の形成された成膜装置用部品20を製造することができる。

【0021】更には、上述した製造方法においては、成膜装置用部品10の母材1と格子状マスク12（または連子格子状マスク22）との相対的位置を固定した状態で溶射、または溶射後にショットblast処理する方法を説明したが、溶射、または溶射後のショットblast処理の途中に、少なくとも何れか一方を上下方向、水平方向、またはその他の方向へ、連続的にまたは断続的に移動させて、形成される溶射膜の凹凸形状に変化を与えるようにしてもよい。また更には、溶射時における母材と溶射ガンとの距離、および溶射に使用する圧縮空気の圧力を溶射の途中で連続的にまたは断続的に変化させて、形成させる溶射膜の凹凸形状に変化を与えるようにしてもよい。

【0022】また、図1のBに示した製造方法においては格子の目11が正方形である格子状マスク12を使用する場合を示したが、格子の目は正方形以外の形状であってもよいことは勿論である。すなわち、図7の部分平面図に代表的な格子の目として、図1のBの製造方法で使用した①正方形のほか、②円形、③正三角形、④正六角形、を示したが、勿論、格子の目はこれら以外の形状であってもよく、また格子の目の配列形状も特に限定されない。

【0023】更には、図2には、角錐台形状の凹凸を有する溶射膜13が形成された成膜装置用部品10を示したが、凹凸の形状は角錐台以外の形状であってもよいことは勿論である。すなわち、図8の部分斜視図に代表的な溶射膜の凹凸の形状として、①円錐、②円錐台、③四角錐、④四角錐台、⑤四角柱、⑥円柱、⑦端部が半球状の円柱、を示し、図9の部分斜視図に、①蛇腹、②管の子、③ラックギヤ、を示したが、勿論、凹凸の形状はこれら以外であってもよく、また凹凸の形成ピッチも特に限定されない。

【0024】

【実施例】次に、本発明における成膜装置用部品およびその製造方法を実施例と比較例によって具体的に説明する。

【0025】（実施例1）スパッタ成膜装置内において、成膜のオン・オフを行うシャッターの製造を目的として、図1のBに示した方法により、格子の目が3mm角の正方形で6mmピッチの格子状マスクを使用して、ステンレス鋼（SUS304）製のシャッター母材の表面にA1の溶射を行い、多数の角錐台形状の凹凸を有するA1溶射膜の形成されたシャッターS1を製造した。そして、採取したA1溶射膜の破断面を走査型電子顕微鏡で観測して、凹凸の高さHは約400μmであり、全体の膜厚は約0.6mmと測定された。また、A1溶射膜の表面粗さRaは12.5μmであった。

【0026】上記のA1溶射膜を有するシャッターS1をスパッタ成膜装置内に組み込んで、連続的に供給されてくる多数個の対象基材に窒化チタン（TiN）膜を形成させた。その時のスパッタ成膜の条件は圧力 3×10^{-3} Torr、スパッタ出力600V、12A（=7.2 kW）であった。この時、成膜をオン・オフさせるシャッターS1にもTiNが付着し厚膜として堆積した。スパッタ成膜装置に付属の成膜レートモニターによる膜厚が50μm増大する毎に、目視によってシャッターS1からのTiN厚膜の剥離の有無を観察したが、剥離が発生した時のTiN厚膜の膜厚は1.3mmであった。この結果は他例と共に表1に示した。

【0027】（実施例2）実施例1で使用したものと同様なシャッター母材の表面に、図4に示した方法によって凹凸を有するチタン（Ti）の溶射膜を形成させた。すなわち、図4のAに示すように、シャッター母材の表面にTiを溶射して厚さ0.5mmのTi溶射膜を形成させた後、図4のBに示すように、Ti溶射膜に格子状マスク12を介して粒度46メッシュのアルミナ（Al₂O₃）粒子によるショットblast処理を施すことにより、多数の凹凸を有するTi溶射膜の形成されたシャッターS2を製造した。その凹凸の高さHはほぼ300μmであった。また、Ti溶射膜13の表面粗さRaは12.0μmであった。

【0028】上記のTi溶射膜を有するシャッターS2を実施例1で使用したスパッタ成膜装置内に組み込み、対象基材へのTiNの成膜に伴って、シャッターS2に付着し堆積するTiN厚膜の剥離状況を実施例1と同様に観察した。シャッターS2からの剥離が認められた時のTiN厚膜の厚さは1.2mmであった。その結果は表1に示した。

【0029】（比較例1）実施例1で使用したものと同様なシャッター母材の表面に、粒度46メッシュのアルミナ（Al₂O₃）粒子を用いるショットblastのみを施してシャッターS3を製造した。得られたショットblast面の表面粗さRaは3.4μmであった。このシャッターS3を実施例1で使用したスパッタ成膜装置内に組み込み、対象基材へのTiNの成膜に伴って、シャッターS3に堆積するTiN厚膜の剥離状況を実施例1と同様に観察したが、シャッターS3からのTiN厚膜の剥離は膜厚が0.2mmの時に発生した。その結果は表1に示した。

【0030】（比較例2）実施例1で使用したものと同様なシャッター母材の表面にショットblastを施し、更に厚さ0.5mmの通常的なA1溶射膜を形成させてシャッターS4を製造した。A1溶射膜の表面粗さRaは12.5μmであった。このシャッターS4を実施例1で使用したスパッタ成膜装置内に組み込み、対象基材へのTiNの成膜に伴って、シャッターS4に付着し堆積するTiN厚膜の剥離状況を実施例1と同様に観察し

たところ、シャッターS₄からのTiN厚膜の剥離は膜厚が0.6mmの時に発生した。その結果は表1に示した。

*【0031】
【表1】

シャッター表面の種類と剥離したTiN膜の膜厚

	成膜材	シャッターモチ材質	溶射膜の材質	表面粗さR _a 、μm	凹凸の高さ、μm	TiN剥離膜厚、mm
実施例1	TiN	SUS304	A1	12.5	400	1.3
実施例2	TiN	SUS304	A1	12.0	300	1.2
比較例1	TiN	SUS304	-	3.4	-	0.2
比較例2	TiN	SUS304	A1	12.5	-	0.6

【0032】表1から明らかなように、比較例1の単にアルミナ粒子によるショットブロストを施したシャッターモチ₃はTiN厚膜が厚さ0.2mmになると剥離を生じ、比較例2のA1溶射膜を形成させたシャッターモチ₄はTiN厚膜が厚さ0.6mmになると剥離を生じたに対して、実施例1のシャッターモチ₁、実施例2のシャッターモチ₂はTiN厚膜が比較例2のシャッターモチ₄の場合の2倍の厚さ1.2mmまでは剥離を発生せず、成膜装置用部品からTiN厚膜を取り除くため、また成膜装置用部品を交換するための成膜装置のクリーニングの間隔を大幅に延長することが可能になることを示す。

【0033】本発明の実施の形態は以上のように構成され作用するが、勿論、本発明はこれらに限定されることなく、本発明の技術的思想に基づいて種々の変形が可能である。

【0034】例えば本実施の形態においては、一定の形状の凹凸が一定のピッチで形成された溶射膜を有する成膜装置用部品およびその製造方法を説明したが、凹凸が付着物の投錨箇所として作用し、付着物の付着強度を増大させる限りにおいて、凹凸は一定の形状であることを必要とせず、また一定のピッチで形成されたものであることを必要としない。

【0035】また本実施の形態においては、本発明の成膜装置用部品が使用される成膜装置としてスパッタ成膜装置を例示したが、それ以外の全ての成膜装置、例えば真空蒸着装置、CVD（化学的気相成長）装置、イオンプレーティング装置にも同様に使用される。

【0036】また本実施の形態においては、成膜装置用部品としてシャッターを例示したが、本発明の成膜装置用部品は、成膜装置内で使用され成膜材料が付着し堆積し易い全ての部品が該当し、具体的には上記のシャッター以外に、例えば成膜させるべき基板以外の箇所へ成膜材料が付着することを防ぐために配置される遮蔽板（防着板）、成膜材料の蒸気を基板へ導くためのチムニー、基板をその周縁部で固定するための基板ホールダ（カバーリング）、基板面に部分的に膜を形成させるために基板上に載置されるマスク、CVD成膜装置において原料※50

※ガスを均等に導入するための整流板、プラズマスパッタ成膜装置においてターゲットの周囲に配置されるアースシールド等が含まれる。

【0037】また本実施の形態においては、A1溶射膜、Ti溶射膜を空孔のない膜として示したが、溶射膜は本来的には多少の空孔を有している。この本来の空孔以外に、溶射条件を調節して、意図的に多孔性の金属溶射膜を形成させてもよく、表面に付着し堆積する厚膜の剥離応力を緩和し易い溶射膜が得られる。

【0038】また本実施の形態においては、成膜装置用部品の母材に形成させる凹凸を持つ溶射膜の材料としてA1およびTiを例示したが、溶射膜の材料には、成膜条件に耐え、かつ形成される膜の剥離応力を緩和し易い材料であれば、その種類は問わない。例えば、上記のA1、Tiのほかニオブ（Nb）、バナジウム（V）、銅（Cu）、また、成膜装置内の温度が比較的低い場合にはアンチモン（Sb）、錫（Sn）、亜鉛（Zn）の使用も可能である。上記の金属は合金であってもよい。

【0039】また本実施の形態においては、溶射装置については言及しなかったが、一般的に採用されている溶射ガンをそのまま適用することができる。加熱はプラズマ式、アーク式、ガス燃焼式の何れであってもよく、また溶射膜の材料は粉末、線、棒の何れの状態で供給するものであってもよい。

【0040】
【発明の効果】本発明の成膜装置用部品およびその製造方法は以上に説明したような形態で実施され、次ぎに記載するような効果を奏する。

【0041】請求項1の成膜装置用部品によれば、形成されている溶射膜の有するそれ自体の表面粗さ（R_a）より大きい凹凸が成膜材料の付着物の投錨箇所となって接着強度を増大させるほか、溶射膜が付着物の剥離応力を緩和するので、付着物が成膜装置用部品から剥離し脱落することによるパーティクルの発生を防ぎ、製品の収率、品質を向上させることができ、更には成膜装置の稼働を停止して行うクリーニングの間隔を長期間化することができるので、成膜装置の稼働率を高くし生産性を向

上させる。

【0042】請求項2の成膜装置用部品によれば、柱状の凸部と、それに反対形状の凹部との繰り返しからなる凹凸が溶射膜の行方向と列方向とに一定のピッチで形成されているので、付着物の接着強度を均等に増大させ、溶射膜が付着物の剥離応力を均等に緩和し、成膜装置用部品からの付着物の剥離、脱落を更に抑制して、ペティクルの発生を防ぎ、クリーニングの間隔を更に長期間化する。請求項3の成膜装置用部品によれば、山部と谷部とからなる凹凸が溶射膜上の任意の一方向に一定のピッチで形成されているので、剥離応力が若干小さい付着物に対して、その接着強度を均等に増大させ、溶射膜が付着物の剥離応力を均等に緩和し、成膜装置用部品からの付着物の剥離、脱落を更に抑制し、クリーニングの間隔を更に長期間化する。

【0043】請求項4の成膜装置用部品によれば、溶射膜の材料が変形し易いアルミニウムまたはチタンであるので、付着物の剥離応力を緩和し、成膜装置用部品からの付着物の剥離、脱落を更に抑制し、クリーニングの間隔を更に長期間化する。請求項5の成膜装置用部品によれば、成膜装置用部品が成膜源に近接して配置される部品、または気体状の成膜材料に接触する部品であり、付着物が成長し易い部品であっても、付着物の剥離、脱落を抑制し、クリーニングの間隔を長期間化する。

【0044】請求項6の成膜装置用部品の製造方法によれば、成膜装置用部品の母材の表面に対し格子状マスクまたは連子格子状マスクを介して溶射を施すか、または通常に溶射膜を形成させた後に格子状マスクまたは連子格子状マスクを介してショットblast処理を施すか、または通常に溶射膜を形成させた後にエッチングレジスト膜を描画し溶射膜の露出している部分を選択的にエッチング処理を施すことにより、それ自体の表面粗さ(R_a)より大きい凹凸を有する溶射膜の形成された成膜装置用部品を容易に製造することができ、得られる成膜装置用部品は成膜材料が付着し厚膜化しても剥離、脱落することを抑制し、製品の収率、品質を向上させると共に、成膜装置の稼働率、生産性を向上させる。

【0045】請求項7の成膜装置用部品の製造方法によれば、格子状マスクとして、格子の目が正方形、正三角形、正六角形、または円形を単位としてパターン状とされたものの中から選択して、成膜装置用部品の形状や成膜材料の種類に応じて、好ましい形状の凹凸を有する溶射膜の形成された成膜装置用部品を製造することができ、得られる成膜装置用部品は成膜材料が付着し厚膜化しても剥離、脱落することを抑制する。請求項8の成膜装置

用部品の製造方法によれば、溶射または溶射後のプラスチック処理の途中において、母材と、格子状マスクまたは連子格子状マスクとの空間的な相対位置を変化させて、成膜装置用部品の形状や成膜材料の種類に応じて、好ましい形状の凹凸を有する溶射膜の形成された成膜装置用部品を製造することができ、得られる成膜装置用部品は成膜材料が付着し厚膜化しても剥離、脱落することを抑制する。

【図面の簡単な説明】

10 10 【図1】格子状マスクを介して溶射膜を形成させて成膜装置用部品を製造する方法を示す図であり、Aは格子状マスクの部分平面図、Bは製造途中の状態を示す断面図である。

【図2】図1Bの方法によって得られる成膜装置用部品の部分斜視図である。

【図3】本発明による溶射膜の凹凸と溶射膜の本来の表面粗さとを関係を概念的に示す図であり、Aは通常に得られる溶射膜を示す断面図、Bは本発明による溶射膜の凹凸を本来の表面粗さと共に示す断面図である。

20 20 【図4】他の製造方法を示す断面図であり、Aは厚さが大で均等な溶射膜が形成された状態を示し、Bはその後に格子状マスクを介してショットblast処理している状態を示す。

【図5】連子格子状マスクを介して溶射膜を形成させて成膜装置用部品を製造する方法を示し、Aは連子格子状マスクの部分平面図、Bは製造途中の状態を示す断面図である。

【図6】図5のBの方法によって得られる成膜装置用部品の部分斜視図である。

30 30 【図7】格子状マスクの目の代表例を示す部分平面図である。

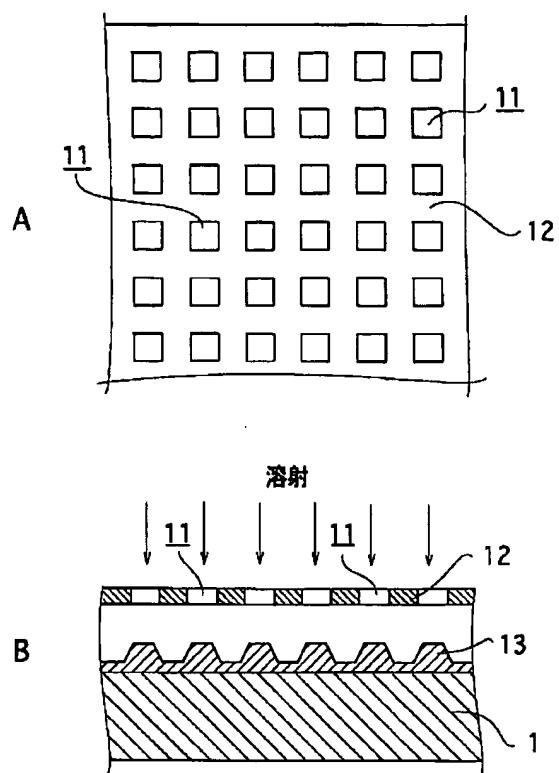
【図8】図9と共に溶射膜の凹凸の代表例を示す部分斜視図である。

【図9】図8と共に溶射膜の凹凸の代表例を示す部分斜視図である。

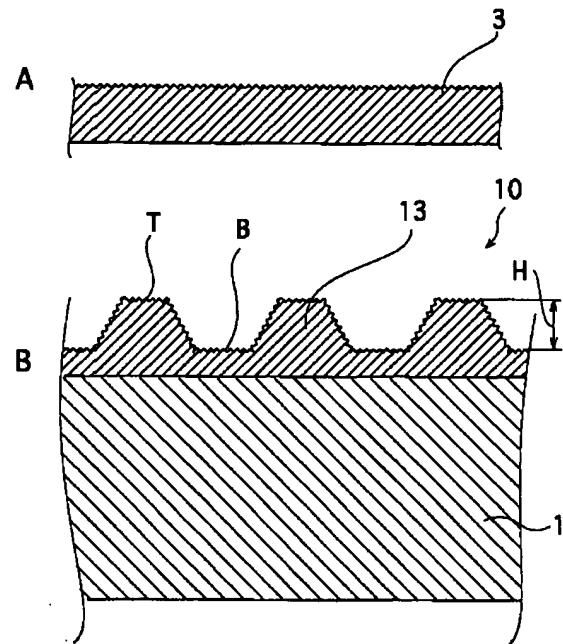
【符号の説明】

1	母材
3	溶射膜
10	成膜装置用部品
40 12	格子状マスク
13	溶射膜
13'	溶射膜
20	成膜装置用部品
22	連子格子状マスク
23	溶射膜

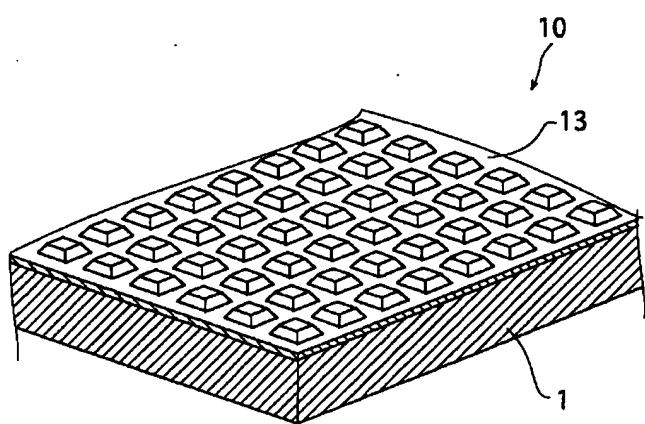
【図1】



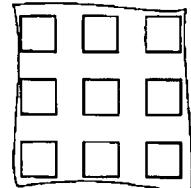
【図3】



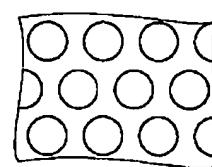
【図2】



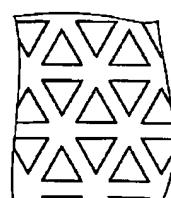
①



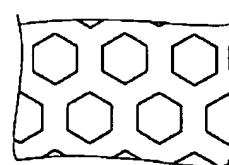
②



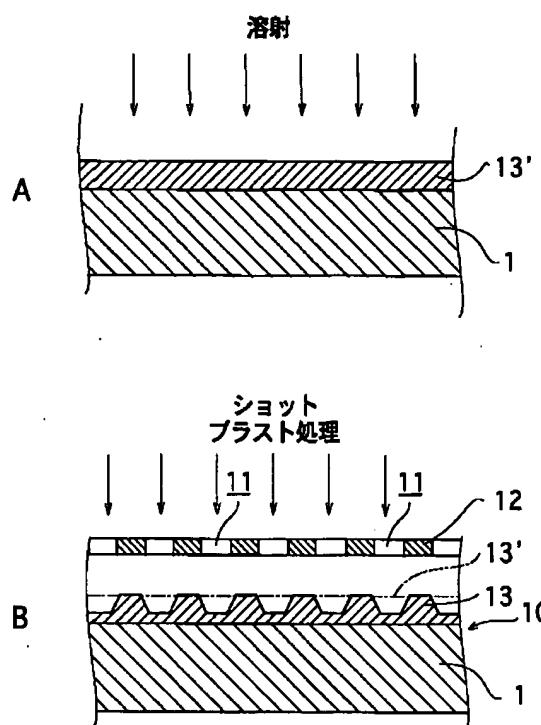
③



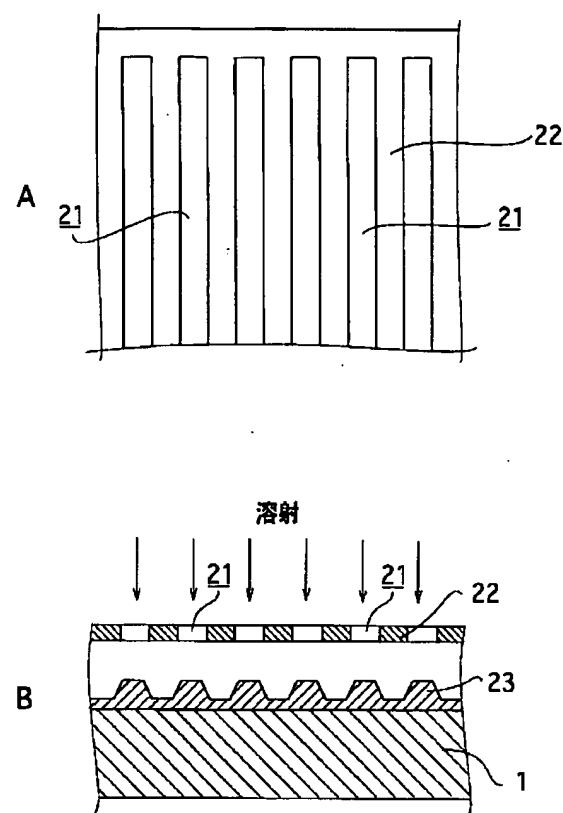
④



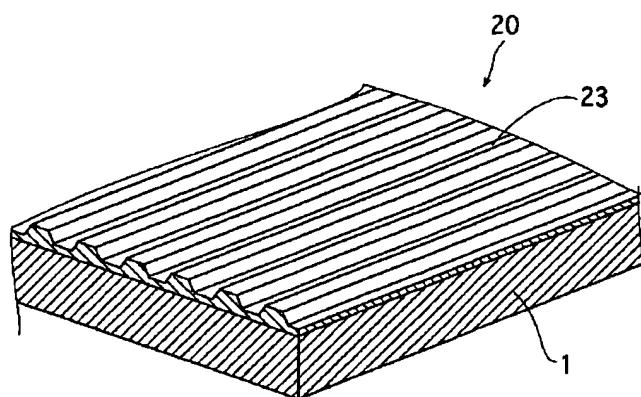
【図4】



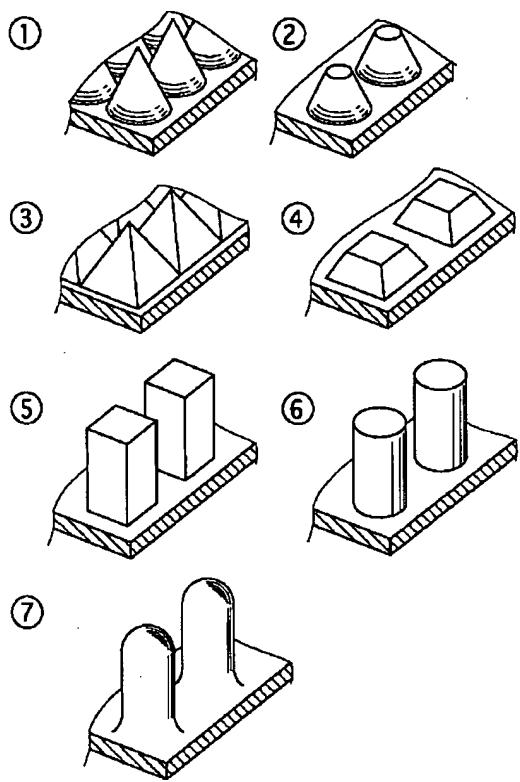
【図5】



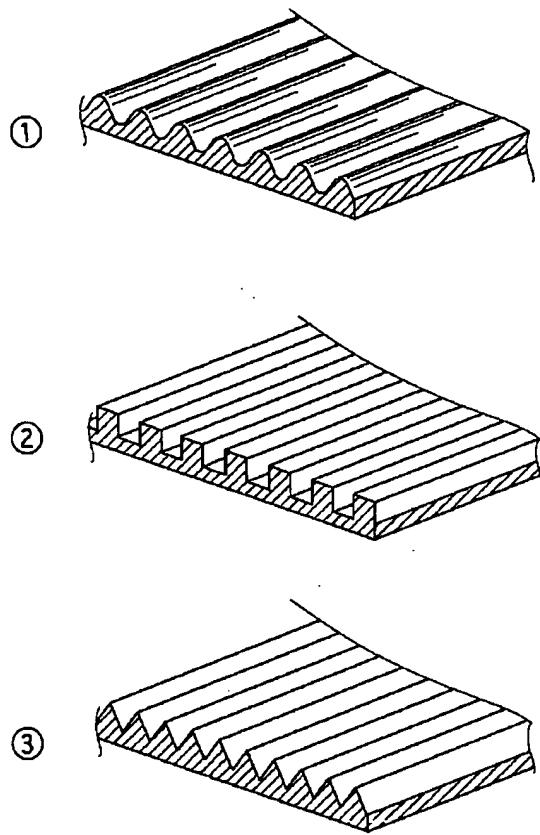
【図6】



【図8】



【図9】



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JAPANESE [JP,2001-049419,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION
TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

Translation done.]

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In the drawings, any words are not translated.

CLAIMS

Claim(s)]

Claim 1] The parts for membrane formation equipments characterized by forming larger irregularity than the surface roughness (Ra) of itself in the aforementioned thermal-spraying film at a large number in the parts for membrane formation equipments with which it is used within membrane formation equipment, and the thermal-spraying film is formed in the front face.

Claim 2] The pillar-shaped heights by which the aforementioned irregularity was formed in the arbitrary line writing directions and the direction of a train of [on the aforementioned thermal-spraying film] in the respectively fixed pitch the part for membrane formation equipments according to claim 1 whose edge the aforementioned heights consist of repeat with the crevice of an opposite configuration succeeding the aforementioned heights, the configurations of the aforementioned heights and the aforementioned crevice have the shape of a cone, a truncated-cone configuration, a pyramid configuration, a truncated-pyramid configuration, a prism configuration, and the shape of a cylindrical shape and has the shape of a semi-sphere-like cylindrical shape.

Claim 3] Aforementioned Yamabe is a part for membrane formation equipments according to claim 1 whose configuration of aforementioned Yamabe and the aforementioned trough it consists of a repeat with the trough of an opposite configuration, and is a bellows configuration, the child configuration of a reed screen, or a rack gear configuration succeeding Yamabe in whom the aforementioned irregularity was formed in the arbitrary pitches fixed the other hand to ** on the aforementioned thermal-spraying film, and aforementioned Yamabe.

Claim 4] The parts for membrane formation equipments given in any from the claim 1 whose material of the aforementioned thermal-spraying film is aluminum or titanium to a claim 3 they are.

Claim 5] The parts for membrane formation equipments given in any from the claim 1 which are the parts with which the aforementioned parts for membrane formation equipments are arranged by approaching the source of membrane formation, or the parts in contact with gas-like membrane formation material to a claim 4 they are.

Claim 6] In the manufacture method of the parts for membrane formation equipments that it is used within membrane formation equipment and the thermal-spraying film is formed in the front face the front face of the base material of the aforementioned parts for membrane formation equipments -- receiving -- a grid-like mask or a latticework -- whether thermal spraying is performed through a grid-like mask after making a target usually form the aforementioned thermal spraying film in the front face of the aforementioned base material -- the aforementioned grid-like mask or the above latticework -- whether blast processing is performed through a grid-like mask After making a target usually form the aforementioned thermal-spraying film in the front face of the aforementioned base material, the portion which formed the etching-resist film in the aforementioned thermal-spraying film in the shape of a pattern, and has exposed the aforementioned thermal-spraying film or by performing etching processing alternatively The manufacture method of parts for membrane formation equipments characterized by making the thermal-spraying film which has the irregular of larger a large number than the surface roughness (Ra) of the aforementioned thermal-spraying film itself form.

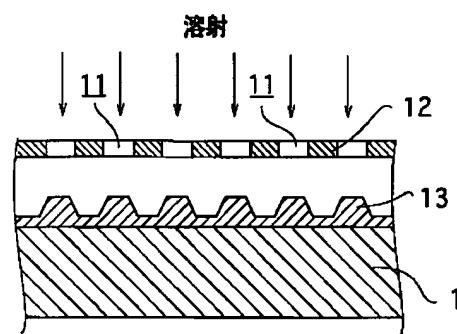
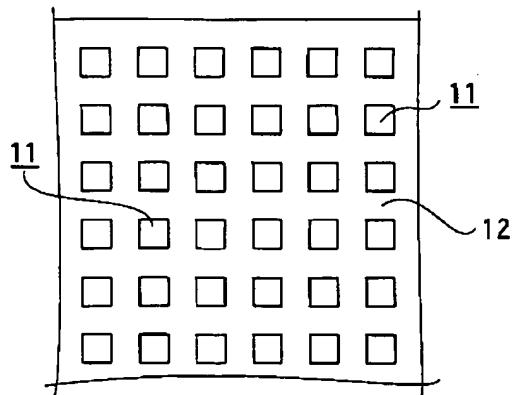
Claim 7] The manufacture method of the part for membrane formation equipments according to claim 6 which use the in which the eye of a grid made the unit the square, the equilateral triangle, the right hexagon, or the round shape, and was formed in the shape of a pattern as the aforementioned grid-like mask.

Claim 8] the blast processing after the aforementioned thermal spraying or the aforementioned thermal spraying -- on the way -- alike -- setting -- the aforementioned base material, and the aforementioned grid-like mask or the above -- latticework -- the manufacture method of the part for membrane formation equipments according to claim 6 or 7 to

which a spatial relative position with a grid-like mask is changed

Translation done.]

Drawing selection [Representative drawing]



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DETAILED DESCRIPTION

Detailed Description of the Invention]

0001]

The technical field to which invention belongs] this invention relates to the part for membrane formation equipments with which the affix of a membrane formation raw material cannot exfoliate easily, and its manufacture method in more detail about the part for membrane formation equipments used within membrane formation equipment, and its manufacture method.

0002]

Description of the Prior Art] Although LSI, a liquid crystal display, a magneto-optic disk, a hard disk, etc. make the film by the membrane formation material according to the purpose form in up to a substrate and are manufactured conventionally, the particle whose particle diameter called particle at the time of this membrane formation is about several micrometers adheres to a substrate, product yield is sharply reduced by short-circuiting wiring etc., and there is a problem which cannot be overlooked of spoiling the reliability of a product further.

0003] Against this, various cures are taken from the former. speaking of sputtering About what is carried in from a conveyance system, and the thing to generate from target material, it is solved mostly. now The component part incorporated in membrane formation equipment, for example, a shutter, (parts made to turn membrane formation on and off between the source of membrane formation, and a substrate) A shield (called the parts and adhesion-proof board which are arranged in order to prevent membrane formation material adhering to membrane formation equipments of than a substrate), and while [other] the affix which adhered and grew thickly with the passage of time forms membranes, to exfoliate, drop out and disperse is made into the large factor which causes generating of particle. However, before an affix exfoliates and drops out, stopping operation of membrane formation equipment, cleaning frequently, and removing an affix shortens the operating time of membrane formation equipment, and it reduces productivity sharply.

0004] The technology of attaching in the front face of the parts for membrane formation equipments the metallic foil which much irregularity was made forming by embossing, and a bellows-like metallic foil is indicated by each official report of JP,3-87356,A, JP,3-87357,A, JP,3-166361,A, and JP,3-166362,A to the above-mentioned problem. In this, according to the configuration of the parts for membrane formation equipments, the electrolytic copper foil in which much irregularity was made to form by embossing is already marketed, and it is piled up so that the front face may be worn, and it is used with spot welding or the rivet, fixing. And since the ablation stress of an affix is eased when an electrolytic copper foil deforms even if an electrolytic copper foil is used within membrane formation equipment, and membrane formation material adheres and it deposits it with parts, it is supposed that it is effective in ablation of an affix and prevention of defluxion.

0005] While performing shot blasting which is made to inject the shot and alumina particle of a minor diameter to the front face of the parts for membrane formation equipments as methods other than an electrolytic copper foil, and is sprayed, and the glass-bead blast (GBB) which is made to inject the bulb of a minor diameter and is sprayed and maintaining surface cleaning, the attempt which is going to increase the bond strength of an affix occurs by making irregularity form and making a surface area into size. Moreover, shot blasting of the front face of the parts for membrane formation equipments is carried out, and there is a method of making a soft metallizing film, for example, an aluminium spraying film, form in up to it, and it is used abundantly. Even if an affix deposits this method on an aluminium-spray film, it is rational at the point of a soft aluminium-spraying film deforming and making ablation stress ease, and

effective.

0006] In addition, to JP,8-277460,A, it machines on the surface of a base material, irregularity is prepared, the parts membrane formation equipments further flooded with the sulfuric acid are indicated, and the parts for membrane formation equipments which the copper (Cu) film was first formed [parts] in JP,11-124661,A on the surface of the b material, and made the porous metal film by stainless steel (SUS420J2) form in up to it further are indicated.

0007]

Problem(s) to be Solved by the Invention] An electrolytic copper foil is torn by ablation stress and the method of using the conventional electrolytic copper foil by which embossing was carried out has the problem that the parts for membrane formation equipments are exposed, if use which an electrolytic copper foil is throwing away and repeats cannot be performed, but the installation removal work is troublesome and also the thickness of an affix exceeds a limit. Moreover, the method of carrying out shot blasting of the front face of the parts for membrane formation equipments does not have ablation of an affix, and the enough prevention effect of defluxion, and what time will also repeat shot blasting by the reason, distortion by the shock heat at the time of shot blasting is accumulated at the parts for membrane formation equipments, and it may result in breakage. Furthermore, if the thickness of an affix is set to about 0.5mm with the parts for membrane formation equipments of ablation stress which made the aluminium-spraying film etc. form in front face are [membrane formation material] large, there is a problem of producing ablation between an aluminium spraying film and a base material, and, now, the method of solution is not found out. Moreover, since each part for membrane formation equipments by JP,8-277460,A and JP,11-124661,A uses acids, such as a sulfuric acid, it is not simple in workability. this invention is made in view of an above-mentioned problem, membrane formation material adheres, and even if you thick-film-ize, let it be a technical problem to offer the part for membrane formation equipment which cannot produce ablation and defluxion easily, and its manufacture method.

0008]

Means for Solving the Problem] Although the above-mentioned technical problem is solved by a claim 1 or the claim of the solution means is explained, the parts for membrane formation equipments of a claim 1 will be parts with which larger irregularity than the surface roughness (Ra) of itself is formed in the thermal-spraying film at a large number in parts for membrane formation equipments with which it is used within membrane formation equipment, and the thermal spraying film is formed in the front face. It does not exfoliate and such parts for membrane formation equipments are omitted, even if the irregularity of the thermal-spraying film acts as an anchoring part of the affix of membrane formation material, and raises a bond strength, and also the thickness of an affix becomes size comparatively, since a thermal-spraying film makes ablation stress ease.

0009] The parts for membrane formation equipments of the claim 2 subordinate to a claim 1. The pillar-shaped height by which irregularity was formed in the arbitrary line writing directions and the direction of a train of [on a thermal-spraying film] in the respectively fixed pitch, Heights consist of a repeat with the crevice of an opposite configuration. Succeeding heights, the configurations of heights and a crevice have the shape of a cone, a truncated-cone configuration, a pyramid configuration, a truncated-pyramid configuration, a prism configuration, and the shape of a cylindrical shape and an edge has the shape of a semi-sphere-like cylindrical shape. By choosing suitably any of the above-mentioned configuration they are according to the kind of membrane formation material, and the configuration of the parts for membrane formation equipments, the relief by the thermal-spraying film of increase of the bond strength of an affix a the ablation stress of an affix is equated on a thermal-spraying film, and such parts for membrane formation equipment suppress ablation of an affix, and defluxion.

0010] Yamabe consists of a repeat with the trough of an opposite configuration succeeding Yamabe by whom the parts for membrane formation equipments of the claim 3 subordinate to a claim 1 were formed in ** in the fixed pitches on thermal-spraying film with arbitrary irregularity on the other hand, and Yamabe, and the configurations of Yamabe are rough are the parts of a bellows configuration, the child configuration of a reed screen, or a rack gear configuration. By choosing suitably any of the above-mentioned configuration they are according to the kind of membrane formation material, and the configuration of the parts for membrane formation equipments, the relief by the thermal-spraying film of increase of the bond strength of an affix and the ablation stress of an affix is equated on a thermal-spraying film, and such parts for membrane formation equipments suppress ablation of an affix, and defluxion.

0011] The parts for membrane formation equipments of the claim 4 subordinate to a claim 1 are parts whose material thermal-spraying film is aluminum or titanium. It is tended to transform such parts for membrane formation equipments the aluminum or titanium of a thermal-spraying film on account of a comparatively small elastic modulus

hey ease the ablation stress of an affix, and suppress ablation and defluxion. The parts for membrane formation equipments of the claim 5 subordinate to a claim 1 are the parts arranged by approaching the source of membrane formation in the parts used within membrane formation equipment, and parts in contact with gas-like membrane formation material. Even if it is the parts to which such a membrane formation material tends to adhere, the parts for membrane formation equipments of this invention suppress ablation of an affix, and defluxion.

0012] Moreover, the manufacture method of the parts for membrane formation equipments of a claim 6 In the manufacture method of the parts for membrane formation equipments that it is used within membrane formation equipment and the thermal-spraying film is formed in the front face the front face of the base material of the parts for membrane formation equipments -- receiving -- a grid-like mask or a latticework -- whether thermal spraying is performed through a grid-like mask after making a thermal-spraying film usually form in a target on the surface of a b material -- a grid-like mask or a latticework -- whether blast processing is performed through a grid-like mask After making a thermal-spraying film usually form in a target on the surface of a base material, the portion which formed the etching-resist film in the front face of a thermal-spraying film in the shape of [predetermined] a pattern, and has exposed the thermal-spraying film or by performing etching processing alternatively It is the method of making the thermal-spraying film which has the irregularity of larger a large number than the surface roughness (Ra) of the thermal-spraying film itself forming. Such a manufacture method of the parts for membrane formation equipments closes manufacturing easily the parts for membrane formation equipments with which the thermal-spraying film which has irregularity was formed, if possible.

0013] The manufacture method of the parts for membrane formation equipments of the claim 7 subordinate to a claim 6 is the method of using that in which the eye of a grid was formed in the shape of a pattern as a grid-like mask by making a square, an equilateral triangle, a right hexagon, or a round shape into a unit. According to the configuration of the parts for membrane formation equipments, or the kind of membrane formation material, such a manufacture method of the parts for membrane formation equipments chooses the configuration of the eye of the above-mentioned grid, and makes it possible to manufacture the parts for membrane formation equipments with which the thermal-spraying film which has the irregularity of a desirable configuration was formed. the manufacture method of the parts for membrane formation equipments of the claim 8 subordinate to a claim 6 -- the blast processing after thermal spraying or thermal spraying - on the way -- alike -- setting -- a base material, and a grid-like mask or a latticework -- it is the method of changing a partial relative position with a grid-like mask Such a manufacture method of the parts for membrane formation equipments makes it possible to manufacture the parts for membrane formation equipments with which the thermal-spraying film which has the irregularity of a desirable configuration was formed according to the configuration of the parts for membrane formation equipments, or the kind of membrane formation material.

0014]

Embodiments of the Invention] Although the part for membrane-formation equipments and its manufacture method in his invention are the manufacture method of the parts for membrane-formation equipments with which larger irregularity than the surface roughness (Ra) of itself is formed in the thermal-spraying film at a large number, and the parts for membrane-formation equipments which make irregularity form in a thermal-spraying film with a grid-like mask. in the parts for membrane-formation equipments with which the thermal-spraying film was formed in the front face having mentioned above, they explain the gestalt of operation of this invention with a drawing below.

0015] Drawing 1 is drawing showing an example of a method which manufactures the parts for membrane formation equipments. That is, A of drawing 1 is the part plan of the grid-like mask 12 used at the time of thermal spraying, and eye 11 of the grid of the square which aligned in the line writing direction and the direction of a train is formed. And B of drawing 1 is the cross section showing the manufacture method of the parts for membrane formation equipments which use the grid-like mask 12. In addition, although the cross section of the grid material of the grid-like mask 12 is considered as the rectangle, it is good also as configurations other than a rectangle. With reference to B of drawing 1 the grid-like mask 12 is held in a fixed height position from the front face of the base material 1 of the parts for membrane formation equipments, and it does not illustrate from the upper part, but ** also performs metalized thermal spraying through the eye 11 of a grid by the thermal spraying gun etc., and the thermal-spraying film 13 which has the irregularity corresponding to the eye 11 of a grid in the front face of a base material 1 is made to form. And drawing 2 is the partial perspective diagram of the parts 10 for membrane formation equipments manufactured by the method shown in B of drawing 1 , and shows the thermal-spraying film 13 which has the irregularity of the truncated-pyramid configuration formed in the front face of a base material 1. In addition, B of drawing 1 and drawing 2 do not show the

irregularity of the thermal-spraying film 13 notionally, and the thickness of a concavo-convex pitch and concavo-convex each part is not shown in proportionality.

0016] Moreover, drawing 3 is drawing which explains notionally the relation between the surface roughness of the common thermal-spraying film 3, and the irregularity of the thermal-spraying film 13 in the parts 10 for membrane formation equipments of this invention. That is, A of drawing 3 is the cross section of the thermal-spraying film 3 usually formed in a target, and B of drawing 3 is the cross section of the parts 10 for membrane formation equipment his invention. Essentially, Ra shows the thermal-spraying film 3 shown in A of drawing 3 in center line average coarseness, and it has 10-20-micrometer surface roughness. On the other hand, although height H may be the irregular which is about 2mm from from when height H from the base B of a crevice to the summit T of heights is the irregular which is about 50 micrometers, as the thermal-spraying film 13 of the parts 10 for membrane formation equipments manufactured by the method of B of drawing 1 is shown in B of drawing 3 with original surface roughness Ra Anywa he height H is farther [than the original surface roughness (Ra) which the thermal-spraying film 3 has] large.

0017] The parts 10 for membrane formation equipments with which the thermal-spraying film 13 with the irregularit of drawing 2 is formed can be manufactured also by the alternative way shown in the cross section of drawing 4. Usu thermal spraying is performed to the front face of the base material 1 of the parts 10 for membrane formation equipments, and thickness makes equal thermal-spraying film 13' form in it in size with reference to A of drawing 4. Subsequently, with reference to B of drawing 4, the grid-like mask 12 is held in the height position in which a fixed listance was opened from the front face of thermal-spraying film 13' of the equal thickness shown with an alternate lo and short dash line. When it does not illustrate from the upper part, but ** also sprays powder or a glass bead of an alumina etc. through the eye 11 of a grid and performs blast processing according to a shot-blasting gun etc. The fron ace of thermal-spraying film 13' serves as the thermal-spraying film 13 which is shaved partially and has irregularity and the parts 10 for membrane formation equipments made into the purpose are manufactured. In B of drawing 4, the hickness of a concavo-convex pitch and concavo-convex each part is not shown in proportionality like B of drawing

0018] in addition, as deformation of the B manufacture method of drawing 4, when thermal-spraying film 13' is for example, (Aluminum aluminum) thermal-spraying film Replace with the grid-like mask 12 and an etching-resist film directly drawn in the shape of a pattern on the front face of aluminum thermal-spraying film. After it *****'s alternatively and acid liquid, such as ferric chloride, a phosphoric acid, and a nitric acid, removes the portion which h exposed thermal-spraying film 13', the parts 10 for membrane formation equipments with which the thermal-spraying ilm 13 which has irregularity was formed can be similarly manufactured by performing etching processing which emoves an etching-resist film.

0019] although the manufacture method shown in B of above-mentioned drawing 1 is the method of using the grid-l mask 12 of lengthwise and a longitudinal direction, when the ablation stress of the affix of membrane formation mate s small a little, it is shown in drawing 5 -- as -- the latticework of only the direction of length (or width) -- it is also possible to use the grid-like mask 22 and to manufacture the parts 20 for membrane-formation equipments with which he thermal-spraying film 23 which has trapezoid wavelike irregularity was formed the latticework by which A of drawing 5 is used with reference to drawing 5 at the time of thermal spraying -- it is the part plan of the grid-like mas 12, and the eye 21 of the grid of a line writing direction (or the direction of a train) is formed and B of drawing 5 -- a atticework -- it is the cross section showing the manufacture method of the parts for membrane formation equipment which use the grid-like mask 22 B of drawing 5 -- referring to -- a height position fixed from the front face of the bas material 1 of the parts 20 for membrane formation equipments -- a latticework -- the grid-like mask 22 is held, it does illustrate from the upper part, but ** also performs metaled thermal spraying through the eye 21 of a grid by the therm spraying gun etc., and the thermal-spraying film 23 which has the irregularity corresponding to the eye 21 of a grid in front face of a base material 1 is made to form And drawing 6 is the partial perspective diagram of the parts 20 for nembrane formation equipments manufactured by the method shown in B of drawing 5 , and shows the thermal-spraying film 23 which has the trapezoid wavelike irregularity formed in the front face of a base material 1. In B of drawing 5 , the thickness of a concavo-convex pitch and concavo-convex each part is not shown in proportionality lik of drawing 1 .

0020] In addition, although the manufacture method of performing shot-blasting processing through the grid-like ma 2 was explained after thickness made equal thermal-spraying film 13' form in the front face of the base material 1 of arts 10 for membrane formation equipments in size in drawing 4 the above-mentioned method -- the grid-like mask changing -- a latticework -- also by using the grid-like mask 22, the parts 20 for membrane formation equipments w

which the thermal-spraying film 23 which has the trapezoid wavelike irregularity shown in drawing 6 was formed can be manufactured.

0021] Furthermore, although how to carry out shot-blasting processing after thermal spraying or thermal spraying in manufacture method mentioned above where the relative position of the base material 1 of the parts 10 for membrane formation equipments and the grid-like mask 12 (or a latticework grid-like mask 22) is fixed was explained. Either is moved in the vertical direction, a horizontal direction, or the direction of other continuously or intermittently at least, you may make it give change in the shape of [of the thermal-spraying film formed] toothed in the middle of the shot-blasting processing after thermal spraying or thermal spraying. Furthermore, you may make it give change in the shape of [of the thermal-spraying film in which change continuously or intermittently the distance of the base material and thermal spraying gun at the time of thermal spraying, and the pressure of the compressed air used for thermal spraying in the middle of thermal spraying, and they are made to form] toothed.

0022] Moreover, although the case where the grid-like mask 12 whose eye 11 of a grid is a square was used in the manufacture method shown in B of drawing 1 was shown, the eye of a grid of your being configurations other than a square is natural. That is, although ** circular besides ** square used by the manufacture method of B of drawing 1, equilateral triangle, and ** positive hexagon were shown in the part plan of drawing 7 as an eye of a typical grid, of course, the eyes of a grid may be configurations other than these, and especially the array configuration of the eye of grid is not limited, either.

0023] Furthermore, although the parts 10 for membrane formation equipments with which the thermal-spraying film which has the irregularity of a truncated-pyramid configuration was formed in drawing 2 were shown, the concavo-convex configuration of your being configurations other than a truncated pyramid is natural. That is, although ** con ** truncated cone, ** square drill, ** square frustum, ** square pole, ** pillar, and ** edge showed the semi-sphere-pillar in the partial perspective diagram of drawing 8 as a configuration of the irregularity of a typical thermal-spraying film and the child of ** bellows and ** reed screen and ** rack gear were shown in the partial perspective diagram of drawing 9, of course, a concavo-convex configuration may be except these, and especially a concavo-convex configuration is not limited, either.

0024]

Example] Next, an example and the example of comparison explain concretely the part for membrane formation equipments in this invention, and its manufacture method.

0025] (Example 1) By the method shown in B of drawing 1 for the purpose of manufacture of the shutter which turn membrane formation on and off in spatter membrane formation equipment Shutter S1 in which aluminum thermal-spraying film which the eye of a grid uses the grid-like mask of 6mm pitch with the square of 3mm angle, performs thermal spraying of aluminum on the front face of the shutter base material made from stainless steel (SUS304), and the irregularity of many truncated-pyramid configurations was formed. It manufactured. And the fracture surface of extracted aluminum thermal-spraying film was observed with the scanning electron microscope, concavo-convex height H is about 400 micrometers, and the whole thickness was measured with about 0.6mm. Moreover, surface roughness of aluminum thermal-spraying film was 12.5 micrometers.

0026] Shutter S1 which has the above-mentioned aluminum thermal-spraying film It incorporated in spatter membrane formation equipment, and the titanium-nitride (TiN) film was made to form in many object base materials supplied continuously. The conditions of the spatter membrane formation at that time were pressure 3×10^{-3} Torr and the spatter outputs 600V and 12A (=7.2kW). Shutter S1 made to turn membrane formation on and off at this time TiN adhered at deposited as a thick film. Whenever the thickness by the membrane formation rate monitor of attachment to spatter membrane formation equipment increases by 50 micrometers, it is a shutter S1 by viewing. Although the existence of ablation of the TiN thick film of a shell was observed, the thickness of a TiN thick film when ablation occurs was ..3mm. This result was shown in Table 1 with other examples.

0027] (Example 2) The thermal-spraying film of the titanium (Ti) which has irregularity by the method shown in drawing 4 was made to form in the front face of the same shutter base material as what was used in the example 1. Namely, shutter S2 in which Ti thermal-spraying film which has much irregularity by performing shot-blasting processing by the alumina (aluminum 2O3) particle of 46 meshes of grain size to Ti thermal-spraying film through the grid-like mask 12 was formed as shown in B of drawing 4 after carrying out thermal spraying of Ti to the front face of shutter base material and making Ti thermal-spraying film with a thickness of 0.5mm form in it as shown in A of drawing 4 It manufactured. Height H of the irregularity was about 300 micrometers. Moreover, surface roughness Ra

Ti thermal-spraying film 13 was 12.0 micrometers.

0028] Shutter S2 which has the above-mentioned Ti thermal-spraying film It incorporates in the spatter membrane formation equipment used in the example 1, it follows on membrane formation of TiN to an object base material, and shutter S2. The ablation situation of the TiN thick film adhered and deposited was similarly observed with the example 1. The thickness of a TiN thick film when the ablation from a shutter S2 is accepted was 1.2mm. The result was shown in Table 1.

0029] (Example 1 of comparison) Only shot blasting which uses the alumina (aluminum 2O3) particle of 46 meshes grain size for the front face of the same shutter base material as what was used in the example 1 is performed, and it is shutter S3. It manufactured. Surface roughness Ra of the acquired shot-blasting side was 3.4 micrometers. this shutter S3 the inside of the spatter membrane formation equipment used in the example 1 -- incorporating -- membrane formation of TiN to an object base material -- following -- shutter S3 although the ablation situation of the TiN thick film to deposit was similarly observed with the example 1 -- shutter S3 from -- ablation of a TiN thick film was generated when thickness was 0.2mm The result was shown in Table 1.

0030] (Example 2 of comparison) Perform shot blasting to the front face of the same shutter base material as what was used in the example 1, usual aluminum thermal-spraying film with a thickness of 0.5mm is made to form further, and is shutter S4. It manufactured. Surface roughness Ra of aluminum thermal-spraying film was 12.5 micrometers. this shutter S4 the inside of the spatter membrane formation equipment used in the example 1 -- incorporating -- membrane formation of TiN to an object base material -- following -- shutter S4 the place which observed similarly the ablation situation of the TiN thick film adhered and deposited with the example 1 -- shutter S4 from -- ablation of a TiN thick film was generated when thickness was 0.6mm The result was shown in Table 1.

0031]

Table 1]

シャッター表面の種類と剥離したTiN膜の膜厚

	成膜材料	シャッター母材の材質	溶射膜の材質	表面粗さRa、μm	凹凸の高さ、μm	TiN剥離膜厚、mm
実施例1	TiN	SUS304	A1	12.5	400	1.3
実施例2	TiN	SUS304	A1	12.0	300	1.2
比較例1	TiN	SUS304	-	3.4	-	0.2
比較例2	TiN	SUS304	A1	12.5	-	0.6

0032] Shutter S3 which only performed shot blasting by the alumina particle of the example 1 of comparison so that clearly from Table 1 Ablation will be produced if a TiN thick film becomes 0.2mm in thickness. Shutter S4 in which aluminum thermal-spraying film of the example 2 of comparison was made to form It receives having produced ablation of a TiN thick film becomes 0.6mm in thickness. the shutter S1 of an example 1, and shutter S2 of an example 2 a TiN thick film -- shutter S4 of the example 2 of comparison it is, in order that ablation may not be generated but 1.2mm in thickness of the double precision of a case may remove a TiN thick film from the parts for membrane formation equipments Moreover, extending sharply the interval of cleaning of the membrane formation equipment for exchanging the parts for membrane formation equipments shows a bird clapper possible.

0033] Although the gestalt of operation of this invention is constituted as mentioned above and it acts, of course base on the technical thought of this invention, various deformation is possible for this invention, without being limited to these.

0034] For example, in the gestalt of this operation, although the part for membrane formation equipments which has thermal-spraying film with which the irregularity of a fixed configuration was formed in the fixed pitch, and its manufacture method were explained, as long as irregularity acts as a **** part of an affix and increases the bond strength of an affix, it does not need not to need that irregularity is a fixed configuration and to be formed in a fixed pitch.

0035] Moreover, in the gestalt of this operation, although spatter membrane formation equipment was illustrated as membrane formation equipment with which the parts for membrane formation equipments of this invention are used,

ised also like all the other membrane formation equipments, for example, a vacuum evaporation system, CVD (chem /vapor growth) equipment, and an ion plating system.

0036] Moreover, in the gestalt of this operation, although the shutter was illustrated as parts for membrane formation equipments The parts for membrane formation equipments of this invention are used within membrane formation equipment, and all the parts that membrane formation material adheres and are easy to deposit correspond. In addition he above-mentioned shutter, specifically For example, the shield arranged in order to prevent membrane formation material adhering to parts other than the substrate which should be made to form (adhesion-proof board), The substra holder for fixing the vapour chimney for leading the steam of membrane formation material to a substrate, and a substrate in the periphery section (covering), In order to make a film form in a substrate side partially, the ground shie arranged around a target in the straightening vane for introducing material gas equally in the mask and CVD membr formation equipment which are laid on a substrate, and plasma spatter membrane formation equipment is included.

0037] Moreover, in the gestalt of this operation, although aluminum thermal-spraying film and Ti thermal-spraying f were shown as a film without a hole, the thermal-spraying film has some holes essentially. Spray condition may be adjusted in addition to this original hole, a porous metallizing film may be made to form intentionally, and the thermal spraying film which is easy to ease the ablation stress of the thick film adhered and deposited on a front face is obtain

0038] Moreover, in the gestalt of this operation, if it is the material which is easy to ease the ablation stress of the fil borne and formed in membrane formation conditions at the material of a thermal-spraying film in the irregularity mad o form in the base material of the parts for membrane formation equipments although aluminum and Ti were illustra is a material of a **** thermal-spraying film, the kind will not be asked. For example, the above-mentioned aluminu niobium (Nb) besides Ti, vanadium (V), copper (Cu), and the temperature in membrane formation equipment are comparatively possible also for use of antimony (Sb), tin (Sn), and zinc (Zn) to a low case. The above-mentioned met may be an alloy.

0039] Moreover, in the gestalt of this operation, although reference was not made about thermal spraying equipment he thermal spraying gun generally adopted is applicable as it is. Heating may be any of a plasma formula, an arc formula, and a gas combustion formula, and the material of a thermal-spraying film may be supplied in the state of an of powder, a line, and a rod.

0040] Effect of the Invention] The part for membrane formation equipments and its manufacture method of this invention a nforced with a gestalt which was explained above, and do so an effect which is indicated below.

0041] According to the parts for membrane formation equipments of a claim 1, larger irregularity than the surface roughness (Ra) of itself which the thermal-spraying film currently formed has serves as an anchoring part of the affix membrane formation material, and increase a bond strength, and also Since a thermal-spraying film eases the ablation stress of an affix, generating of the particle by an affix exfoliating and dropping out of the parts for membrane format equipments is prevented. Since the interval of the cleaning which the yield of a product and quality can be raised and performed by stopping operation of membrane formation equipment further can be long-period-of-time-ized, the operating ratio of membrane formation equipment is made high, and productivity is raised.

0042] Since pillar-shaped heights and the irregularity which becomes it from a repeat with the crevice of an opposite configuration are formed in the line writing direction and the direction of a train of a thermal-spraying film in the fixe pitch according to the parts for membrane formation equipments of a claim 2 The bond strength of an affix is increase equally, and a thermal-spraying film eases the ablation stress of an affix equally, suppresses further ablation of the aff from the parts for membrane formation equipments, and defluxion, prevents generating of particle, and long-period-o me-izes the interval of cleaning further. Since the irregularity which consists of Yamabe and a trough is formed in th arbitrary pitches fixed on the other hand to ** on a thermal-spraying film according to the parts for membrane format equipments of a claim 3, to an affix with ablation stress small a little, the bond strength is increased equally, and a thermal-spraying film eases the ablation stress of an affix equally, suppresses further ablation of the affix from the pa or membrane formation equipments, and defluxion, and long-period-of-time-izes the interval of cleaning further.

0043] Since it is the aluminum or titanium which is easy to transform the material of a thermal-spraying film accordi o the parts for membrane formation equipments of a claim 4, the exfoliation stress of an affix is eased, exfoliation of affix from the parts for membrane formation equipments and omission are suppressed further, and the interval of cleaning is long-period-of-time-ized further. According to the parts for membrane formation equipments of a claim 5 even if it is the parts with which the parts for membrane formation equipments are arranged by approaching the sourc

nembrane formation, or the parts in contact with gas-like membrane formation material and is the parts with which a affix tends to grow, exfoliation of an affix and omission are suppressed and the interval of cleaning is long-period-of-ime-ized.

0044] according to the manufacture method of the parts for membrane formation equipments of a claim 6 -- the front ace of the base material of the parts for membrane formation equipments -- receiving -- a grid-like mask or a latticew - whether thermal spraying is performed through a grid-like mask after [or] making a thermal-spraying film usually form in a target -- a grid-like mask or a latticework -- whether shot-blasting processing is performed through a grid-li nask Or by performing etching processing alternatively, the portion which drew the etching-resist film and has expos he thermal-spraying film after making a thermal-spraying film usually form in a target The parts for membrane formation equipments with which the thermal-spraying film which has larger irregularity than the surface roughness (of itself was formed can be manufactured easily. Membrane formation material adheres, and they raise the operating atio of membrane formation equipment, and productivity while they suppress exfoliating and dropping out and raise yield of a product, and quality, even if it thick-film-izes the parts for membrane formation equipments obtained.

0045] According to the manufacture method of the parts for membrane formation equipments of a claim 7, as a grid-nask It chooses from those by which the eye of a grid was made the shape of a pattern by making a square, an equilateral triangle, a right hexagon, or a round shape into a unit. According to the configuration of the parts for nembrane formation equipments, or the kind of membrane formation material, the parts for membrane formation equipments with which the thermal-spraying film which has the irregularity of a desirable configuration was formed c be manufactured, and membrane formation material adheres, and even if it thick-film-izes the parts for membrane formation equipments obtained, they suppress exfoliating and dropping out. According to the manufacture method of parts for membrane formation equipments of a claim 8, it sets in the middle of the blast processing after thermal spray or thermal spraying. A spatial relative position with a grid-like mask is changed. a base material, and a grid-like mask latticework -- According to the configuration of the parts for membrane formation equipments, or the kind of nembrane formation material, the parts for membrane formation equipments with which the thermal-spraying film which has the irregularity of a desirable configuration was formed can be manufactured, and membrane formation material adheres, and even if it thick-film-izes the parts for membrane formation equipments obtained, they suppress exfoliating and dropping out.

Translation done.]